

# SYLLABUS 2021-2022

STANDARD: 11

SUBJECT: PHYSICS

UNIT	CONTENT
<b>1. Nature of Physical world and Measurement</b>	1.1 Science - Introduction 1.1.1 The Scientific Method 1.2 Physics - Introduction 1.2.1 Branches of physics 1.2.2 Scope and Excitement of Physics 1.3 Physics in Relation to technology and society 1.5.1 (ii) Measurement of Large distance 1.5.3 Measurement of Time intervals 1.6 Theory of errors 1.6.1 Accuracy and precision 1.6.2 Errors in measurement 1.6.3 Error Analysis 1.6.4 Propagation of errors 1.7 Significant Figures 1.7.1 Definition and rules of significant figures 1.7.2 Rounding off 1.7.3 Arithmetical operations with significant figures 1.8 Dimensional analysis 1.8.1 Dimension of Physical Quantities 1.8.2 Dimensional quantities, Dimensionless quantities, Principle of homogeneity 1.8.3 Application and limitations of the method of Dimensional analysis
<b>2. Kinematics</b>	2.1 Introduction 2.2 concept of Rest and Motion 2.3.3 Addition of vectors 2.3.4 Subtraction of vectors 2.4 Components of a vector 2.4.1 Vector addition using components 2.5 Multiplication of vector by a scalar 2.5.1 Scalar product of two vectors 2.5.2 The vector product of two vector

	<ul style="list-style-type: none"> <li>2.5.3 Properties of the components of vector</li> <li>2.10 Motion along one dimension <ul style="list-style-type: none"> <li>2.10.1 Average velocity</li> <li>2.10.2 Relative velocity in one and two dimensional motion</li> <li>2.10.3 Equations of uniformly accelerated motion by calculus method</li> </ul> </li> <li>2.11 Projectile Motion <ul style="list-style-type: none"> <li>2.11.1 Introduction</li> <li>2.11.2 Projectile in horizontal projection</li> <li>2.11.3 Projectile under an angular projection</li> <li>2.11.4 Introduction to Degrees and radians</li> <li>2.11.5 Angular displacement</li> <li>2.11.6 Circular motion</li> </ul> </li> </ul>
<b>3. Laws of motion</b>	<ul style="list-style-type: none"> <li>3.1 Introduction</li> <li>3.2 Newton's laws <ul style="list-style-type: none"> <li>3.2.1 Newton's First Law</li> <li>3.2.2 Newton's Second Law</li> <li>3.2.3 Newton's Third Law</li> </ul> </li> <li>3.3 Applications of Newton's laws <ul style="list-style-type: none"> <li>3.3.1 Free body diagram</li> <li>3.3.2 Particle moving in an inclined plane</li> <li>3.3.3 Two bodies in contact on a Horizontal surface</li> <li>3.3.4 Motion of connected bodies</li> <li>3.3.5 Concurrent Forces and Lami's Theorem</li> </ul> </li> <li>3.6 Friction <ul style="list-style-type: none"> <li>3.6.1 Introduction</li> <li>3.6.2 Static friction</li> <li>3.6.3 Kinetic friction</li> <li>3.6.4 To move an object- push or pull? Which is easier?</li> <li>3.6.5 Angle of Friction</li> <li>3.6.6 Angle of repose</li> <li>3.6.7 Application of angle of repose</li> <li>3.6.8 Rolling Friction</li> </ul> </li> <li>3.7 Dynamics of circular motion <ul style="list-style-type: none"> <li>3.7.2 Vehicle on a leveled circular road</li> <li>3.7.3 Banking of tracks</li> </ul> </li> </ul>

<b>4. Work, energy and power</b>	<ul style="list-style-type: none"> <li>4.1 Introduction</li> <li>4.1.2 Workdone by a constant force</li> <li>4.2 Energy <ul style="list-style-type: none"> <li>4.2.1 Kinetic Energy</li> <li>4.2.2 Work- Kinetic Energy</li> <li>4.2.3 Relation between Momentum and Kinetic energy</li> <li>4.2.4 Potential Energy</li> </ul> </li> <li>4.3 Power <ul style="list-style-type: none"> <li>4.3.1 Definition of power</li> <li>4.3.2 Unit of power</li> </ul> </li> <li>4.4 Collisions <ul style="list-style-type: none"> <li>4.4.1 Types of collisions</li> <li>4.4.2 Elastic collisions in one dimension</li> <li>4.4.4 Loss of kinetic energy in perfect inelastic collision</li> </ul> </li> </ul>
<b>5. Motion of system of particles and rigid bodies</b>	<ul style="list-style-type: none"> <li>5.1 Introduction <ul style="list-style-type: none"> <li>5.1.1 Centre of mass</li> <li>5.1.2 Center of Mass of a Rigid Body</li> <li>5.1.3 Center of Mass for Distributed point masses</li> <li>5.1.4 Center of Mass of Two point masses</li> <li>5.1.5 Center of mass for uniform distribution of mass</li> </ul> </li> <li>5.2 Torque and Angular Momentum <ul style="list-style-type: none"> <li>5.2.1 Definition of Torque</li> <li>5.2.2 Torque about an axis</li> <li>5.2.3 Torque and Angular Acceleration</li> <li>5.2.4 Angular Momentum</li> <li>5.2.5 Angular Momentum and Angular Velocity</li> <li>5.2.6 Torque and angular Momentum</li> </ul> </li> <li>5.3 Couple <ul style="list-style-type: none"> <li>5.3.3 Principle of moments</li> <li>5.3.4 Center of Gravity</li> <li>5.3.5 Bending of cyclist in curves</li> </ul> </li> <li>5.4 Moment of inertia <ul style="list-style-type: none"> <li>5.4.1 Moment of inertia of a uniform Rod</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>5.5 Rotational Dynamics</li> <li>5.5.1 Effect of Torque on Rigid Bodies</li> <li>5.5.3 Work done by Torque</li> <li>5.5.4 Kinetic Energy in Rotation</li> <li>5.5.5 Power delivered by Torque</li> <li>5.5.6 Comparison of translational and rotational quantities</li> <li>5.6.3 Kinetic energy in pure rolling</li> <li>5.6.4 Rolling on Inclined plane</li> </ul>
<b>6. Gravitation</b>	<ul style="list-style-type: none"> <li>6.1 Introduction</li> <li>6.2.2 Superposition principle for gravitational field</li> <li>6.2.3 Gravitational potential energy</li> <li>6.2.4 Gravitational potential energy near the surface of the earth</li> <li>6.2.5 Gravitational potential <math>v(r)</math></li> <li>6.3 Acceleration due to gravity of the earth</li> <li>6.3.1 Variation of <math>g</math> with altitude, depth and latitude</li> <li>6.4 Escape speed and orbital speed</li> <li>6.4.1 Satellites, orbital speed and time period</li> <li>6.4.2 Energy of an orbiting satellite</li> <li>6.4.3 Geo- stationary and polar satellite</li> <li>6.4.4 Weightlessness weight of an object</li> <li>6.5 Elementary ideas of astronomy</li> </ul>
<b>7. Properties of matter</b>	<ul style="list-style-type: none"> <li>7.1 Introduction</li> <li>7.2 Microscopic understanding of various states of matter</li> <li>7.2.1 Elastic behaviour of materials</li> <li>7.2.2 Stress and strain</li> <li>7.2.3 Hooke's law and its experimental verification</li> <li>7.2.5 Poisson's ratio</li> <li>7.2.6 Elastic energy</li> <li>7.2.7 Applications of elasticity</li> <li>7.4 Viscosity</li> <li>7.4.1 Introduction</li> <li>7.4.2 Streamlined flow</li> </ul>

	<ul style="list-style-type: none"> <li>7.4.3 Turbulent flow</li> <li>7.4.4 Reynold's number</li> <li>7.4.5 Terminal velocity</li> <li>7.4.6 Stoke's law and its applications</li> <li>7.4.7 Poiseuille's equation</li> <li>7.4.8 Applications of viscosity</li> <li>7.5.2 Factors affecting the surface tension of a liquid</li> <li>7.5.3 Surface energy (s.e.) and surface tension (s.t.)</li> <li>7.5.4 Angle of contact</li> <li>7.5.5 Excess of pressure inside a liquid drop, a soap bubble, and an air bubble</li> <li>7.5.6 Capillarity</li> <li>7.5.7 Surface tension by capillary rise method</li> <li>7.5.8 Applications of surface tension</li> <li>7.6 Bernoulli's theorem</li> <li>7.6.1 Equation of continuity</li> <li>7.6.3 Bernoulli's theorem and its applications</li> </ul>
<b>8. Heat and Thermodynamics</b>	<ul style="list-style-type: none"> <li>8.1 Heat and Temperature</li> <li>8.1.1 Introduction</li> <li>8.2.4 Anomalous expansion of water</li> <li>8.2.6 Calorimetry</li> <li>8.2.8 Newton's law of cooling</li> <li>8.3 Laws of Heat transfer</li> <li>8.3.1 Prevost theory of heat exchange</li> <li>8.3.2 Stefan Boltzman law</li> <li>8.3.3 Wien's displacement law</li> <li>8.4 Thermodynamics</li> <li>8.4.1 Introduction</li> <li>8.4.3 Thermodynamics state variables</li> <li>8.5 Zeroth law of thermodynamics</li> <li>8.6 Internal Energy (U)</li> <li>8.6.1 Joule's Mechanical equivalent of heat</li> <li>8.6.2 First law of Thermodynamics</li> <li>8.6.3 Quasi static process</li> <li>8.6.4 Work done in volume changes</li> <li>8.6.5 PV Diagram</li> </ul>

	<ul style="list-style-type: none"> <li>8.7.2 Meyer's relation</li> <li>8.8 Thermodynamic process <ul style="list-style-type: none"> <li>8.8.1 Isothermal process</li> <li>8.8.2 Adiabatic process</li> <li>8.8.3 Isobaric process</li> <li>8.8.4 Isochoric process</li> <li>8.8.5 Cyclic process</li> <li>8.8.6 P. V Diagram for a cyclic process</li> </ul> </li> <li>8.9 Heat engine <ul style="list-style-type: none"> <li>8.9.1 Carnot's ideal heat engine</li> <li>8.9.2 Efficiency of a Carnot's engine</li> <li>8.9.3 Entropy &amp; Second law of Thermodynamics</li> </ul> </li> </ul>
<b>9. Kinetic theory of gases</b>	<ul style="list-style-type: none"> <li>9.1 Kinetic theory <ul style="list-style-type: none"> <li>9.1.1 Introduction</li> </ul> </li> <li>9.2 Pressure exerted by a gas <ul style="list-style-type: none"> <li>9.2.1 Expression for pressure exerted by a gas</li> <li>9.2.2 Kinetic interpretation of temperature</li> <li>9.2.3 Relation between, Pressure &amp; mean kinetic Energy</li> </ul> </li> <li>9.3 Degrees of freedom <ul style="list-style-type: none"> <li>9.3.1 Definition</li> <li>9.3.2 Mono atomic Molecule</li> <li>9.3.3 Diatomic Molecule</li> <li>9.3.4 Triatomic Molecule</li> </ul> </li> <li>9.4 Laws of equi partition of energy <ul style="list-style-type: none"> <li>9.4.1 Application of law of equipartition of energy in specific heat of gas</li> </ul> </li> <li>9.5 Mean free path</li> </ul>
<b>10. Oscillation</b>	<ul style="list-style-type: none"> <li>10.1 Introduction <ul style="list-style-type: none"> <li>10.1.1 Periodic and non-periodic motion</li> <li>10.1.2 Oscillatory motion</li> </ul> </li> <li>10.2 Simple Harmonic motion (SHM) <ul style="list-style-type: none"> <li>10.2.1 The Projection of uniform circular motion on a diameter of SHM</li> </ul> </li> </ul>

	<p>10.2.2 Displacement, Velocity, acceleration and its graphical representation-SHM</p> <p>10.2.3 Time period, frequency, phase, phase difference and epoch in SHM</p> <p>10.4.1 Horizontal oscillations of a spring-mass system</p> <p>10.4.2 Vertical Oscillation of a spring</p> <p>10.4.3 Combination of springs</p> <p>10.4.4 Oscillation of a Simple pendulum in SHM and laws of simple pendulum</p> <p>10.5 Energy in SHM</p>
<b>11. Waves</b>	<p>11.1 Introduction</p> <p>11.1.1 Ripples and wave formation on the water surface</p> <p>11.1.2 Formation of waves on stretched strings</p> <p>11.1.3 Formation of waves in a tuning fork</p> <p>11.1.4 Characteristics of wave motion</p> <p>11.1.5 Mechanical wave motion and its types</p> <p>11.1.6 Transverse wave motion</p> <p>11.1.7 Longitudinal wave motion</p> <p>11.2 Terms and definition used in wave motion</p> <p>11.3 Velocity of waves in different media</p> <p>11.3.1 Velocity of transverse waves in a stretched string</p> <p>11.3.2 Velocity of longitudinal waves in an elastic medium</p> <p>11.4 Propagation of sound waves</p> <p>11.4.1 Newton's formula for speed of sound waves in air</p> <p>11.4.2 Laplace's correction</p> <p>11.6 Progressive waves or Travelling wave.</p> <p>11.6.1 Characteristics of progressive waves</p> <p>11.6.2 Equation of a plane progressive wave</p> <p>11.6.3 Graphical representation of wave</p> <p>11.6.4 Particle velocity and wave velocity</p> <p>11.7 Superposition principle</p> <p>11.7.1 Interference of waves</p> <p>11.7.2 Formation of beats</p>

	11.8 Standing waves 11.8.1 Explanation of stationary waves 11.8.2 Characteristics of stationary waves 11.8.3 Stationary waves in Sonometer 11.8.4 Fundamental frequency and over tones 11.8.5 Laws of transverse vibrations in stretched strings 11.9 Intensity and loudness 11.9.1 Intensity of sound 11.9.2 Loudness of sound 11.9.3 Intensity and loudness of sound 11.10 Vibrations of air column
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## PRACTICAL

STANDARD: 11		SUBJECT: PHYSICS
Sl.No	Topic	
1	Moment of inertia of a solid sphere of known mass using vernier callipers.	
2	Spring constants of a spring	
3	Acceleration due to gravity using simple pendulum.	
4	Viscosity of a liquid by Stoke's method	
5	Study of the relation between frequency and length of the given wire under constant tension using sonometer	